



Industrial Silica Sands of Minnesota

Frequently Asked Questions and Answers—March 2012

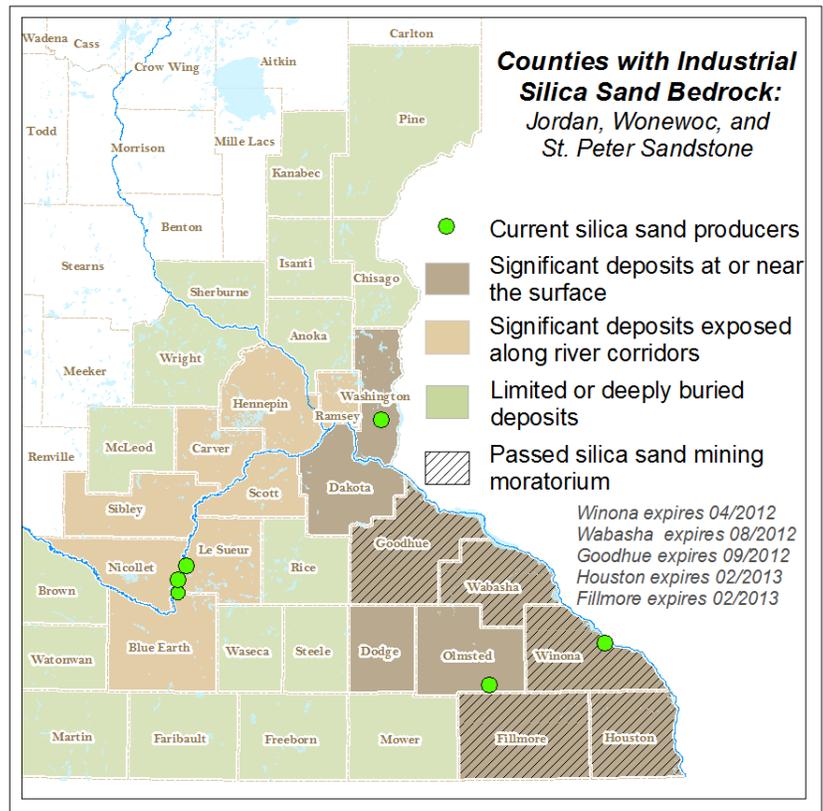
WHAT IS INDUSTRIAL SILICA SAND (FRAC SAND)? Industrial silica sand refers to sand having the composition and grain-size distribution required for industrial applications. Specifically, industrial silica sand consists of well-rounded, sand composed of almost pure quartz grains. Quartz, or silicon dioxide (SiO₂), is one of the most common minerals found on the Earth’s surface and is found in rocks like granite, gneiss, and sandstone. Industrial silica sand is a higher value product than sand and gravel used in the construction industry.

WHERE IS INDUSTRIAL SILICA SAND FOUND?

Industrial silica sand is mined from sandstones occurring in portions of Minnesota, Wisconsin, Iowa, and Illinois. In Minnesota, glacial drift and other bedrock layers commonly exist on top of the sandstone. Three sandstone formations have potential for producing high quality industrial silica sand. The Jordan and Wonewoc sandstones are the most sought after sources followed by the St. Peter sandstone.*

WHAT IS THE CURRENT STATUS OF INDUSTRIAL SAND MINING IN MINNESOTA?

Industrial silica sand is found in the southeastern portion of the state. Six mining operations are currently known to extract industrial silica sand. Mines may or may not process the sand on-site. Three off-site processing plants are currently known to receive silica sand from various mining operations in Minnesota and Wisconsin. To date, five counties, Winona, Goodhue, Wabasha, Houston, and Fillmore, passed moratoria on new permits for industrial silica sand mining.



HOW IS IT MINED? In Minnesota, all industrial silica sand mines operate as surface quarries. However, both surface quarries and underground mines exist in other states.

WHAT TYPES OF INDUSTRIES USE SILICA SAND? Industrial silica sand has been mined in the Upper Midwest for over a century. Uses for this resource include a variety of products and applications like glass-making, abrasives, golf course sand traps, and frac sand. Over the past decade, a sharp increase in demand for industrial silica sand corresponded with a rapid expansion of shale oil and gas development. An extraction method called hydraulic fracturing is used to produce oil and gas from shale bedrock and requires approximately 10,000 tons of industrial silica sand per well. Due to increased demand, permits for new industrial silica sand mines and expansion of existing mines are being submitted across the southeastern portion of Minnesota.

*Dustman, J.E., Gulbranson, B., Bell, P., Gregg, W., 2011: Characteristics of high quality frac sand, and where to find it in the upper Midwest., Geological Society of America Abstracts with Programs, Vol. 43, No 5.

Minnesota Department of Natural Resources– Division of Lands and Minerals

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WHAT IS “FRACKING”? Fracking is slang for hydraulic fracturing. In the hydraulic fracturing process, a mixture of industrial silica sand (frac sand), water, and chemicals is injected under high pressures to maintain fractures in shale bedrock. The sand-filled cracks and fissures create conduits for fluids and gas to flow into an oil and gas well.

IS FRACKING OCCURRING IN MINNESOTA? No. Sand used for hydraulic fracturing is mined and/or processed in Minnesota. The sand is then transported out of the state by rail to oil and natural gas producing regions (e.g. Western North Dakota, Pennsylvania, and New York).

WHY HERE? WHAT MAKES OUR SAND SO UNIQUE? Even though sand can be found all over the world, sandstones found in the Upper Midwest have several unique physical properties (listed below). It is one of a few places on Earth where this resource occurs, making it a globally desired commodity.



Composition: Sand usually contains many different rock types; however, industrial silica sand produced in this region consists of nearly 99% quartz.

Strength: Quartz is a very hard mineral and able to withstand high pressures produced during the hydraulic fracturing process without breaking.

Shape: The sand grains are shaped like little ball bearings which allow for oil and gas to flow between individual grains without clogging the fractured rock.

Size: The sand grains are fairly uniform in size. When washed and screened, the sands meet the precise grain-size distribution required for hydraulic fracturing.

WHO REGULATES INDUSTRIAL SILICA SAND MINING? Counties, townships, or municipalities are the responsible governmental unit (RGU) for administering permits to mine for industrial silica sand. Conditional land use permits, sometimes called special use permits, may be required from local planning and zoning offices.

WHO ARE THE OTHER REGULATING AUTHORITIES? Depending on size and scope, the proposed mining operation may be subject to the following state and federal permits and regulations:

Department of Natural Resources (DNR)- Water Appropriation Permit; Public Waters Work Permit; Burning Permit; and Endangered or Threatened Species Taking Permit.

Pollution Control Agency (MPCA)- Section 401 Certification; Storm Water, Wastewater, and Air Quality Regulations.

Board of Water and Soil Resources (BWSR)- Wetland Conservation Act.

US Army Corps of Engineers- Section 404 Permit (discharge of dredged or fill material or excavation within waters and wetlands may require approval of the US Army Corps of Engineers).

Environmental Quality Board (EQB): Conducts environmental reviews in the form of an Environmental Assessment Worksheet (EAW) for operations excavating 40 or more acres of land at a mean depth of 10 feet and Environmental Impact Statement (EIS) for operations exceeding 160 acres.

Minnesota Department of Natural Resources

Division of Lands and Minerals
Larry Kramka, Director

500 Lafayette Rd
Saint Paul, Minnesota
55155-4045

Phone: 651-259-5959
Fax: 651-296-5939